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THE EXPANSION OF MAGNETIC CLOUDS

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Magnetic clouds are a carefully defined sub-class of all interplanetary signatures of coronal mass ejections whose geometry is thought to be that shown below. Klein and Burlaga (1982) found that the total magnetic pressure inside clouds is higher than the ion pressure outside and concluded that clouds are expanding at 1 AU at about half the local Alfvén speed. This conclusion was supported by indirect evidence and bolstered by direct evidence in later publications. However, the geometry of clouds is such that even though the magnetic pressure inside is larger than the total pressure outside, expansion will not occur because the pressure is balanced by magnetic tension - the pinch effect (Suess, 1986).

The evidence for expansion of clouds at 1 AU is nevertheless quite strong so another reason for its existence must be found. It will be shown here that the observations can be reproduced by taking into account the effects of geometrical distortion of the low plasma beta clouds as they move away from the sun.

Klein, L. W., and Burlaga, L. F., 1982, J. Geophys. Res. 87, 613.
Suess, S. T., 1986, EOS 67, 1141.

